What is claimed is:

1. A method of forming an aperture in a silicon oxide layer, the method comprising:
generating a plasma containing fluorine and at least one element selected from the group consisting of bromine and iodine;
accelerating ions from the plasma toward a surface of the silicon oxide layer;
etching an exposed portion of the silicon oxide layer, thereby advancing an etch front into the silicon oxide layer and forming the aperture having sidewalls;
absorbing components containing the at least one element on the sidewalls of the aperture; and
continuing to advance the etch front and absorb components containing the at least one element on the sidewalls of the aperture until a desired aspect ratio is attained;
wherein a content of the at least one element is sufficient to produce a taper angle of the sidewalls of greater than about 87°.

2. The method of claim 1, further comprising forming a polymer residue while advancing the etch front into the silicon oxide layer and depositing the polymer residue on sidewall portions of the silicon oxide layer such that the sidewalls of the aperture contain the polymer residue.

3. The method of claim 2, wherein absorbing components containing the at least one element on the sidewalls of the aperture further comprises absorbing the components on the polymer residue.

4. The method of claim 2, wherein absorbing components containing the at least one element on the sidewalls of the aperture further comprises incorporating the components within the polymer residue.

5. The method of claim 1, wherein accelerating ions from the plasma toward a surface of the silicon oxide layer further comprises accelerating ions from the plasma toward a surface of the silicon oxide layer using a bias power of at least approximately 900 watts.

6. The method of claim 1, wherein generating a plasma containing fluorine and at least one element selected from the group consisting of bromine and iodine further comprises generating a plasma having at least one fluorine-containing source gas and at least one bromine- or iodine-containing source gas.

7. The method of claim 6, wherein generating a plasma having at least one fluorine-containing source gas and at least one bromine- or iodine-containing source gas further comprises generating a plasma having at least one fluorine-containing source gas and modifying a composition of the plasma by adding at least one bromine- or iodine-containing source gas.

8. The method of claim 7, wherein modifying a composition of the plasma occurs during etching an exposed portion of the silicon oxide layer.

9. The method of claim 6, wherein each fluorine-containing source gas is selected from the group consisting of perfluorocarbons and hydrofluorocarbons.

10. The method of claim 9, wherein each fluorine-containing source gas is selected from the group consisting of trifluoromethane, difluoromethane, pentafluoroethane, perfluoropropene, perfluoropropane and perfluorobutene.

11. The method of claim 6, wherein any bromine-containing source gas is selected from the group consisting of hydrogen bromide, bromotrifluoromethane, a bromine-substituted fluorocarbon and a bromine-substituted hydrofluorocarbon.

12. The method of claim 6, wherein any iodine-containing source gas is selected from the group consisting of hydrogen iodide, iodotrifluoromethane, an iodine-substituted fluorocarbon and an iodine-substituted hydrofluorocarbon.

13. The method of claim 1, wherein the silicon oxide layer contains a silicon oxide material selected from the group consisting of doped and undoped silicon oxide materials.

14. The method of claim 13, wherein the silicon oxide layer contains a silicon oxide material selected from the group consisting of silicon dioxide, tetraethylorthosilicate, a silicon oxynitride, borosilicate glass, phosphosilicate glass and borophosphosilicate glass.

15. The method of claim 1, wherein accelerating ions from the plasma toward a surface of the silicon oxide layer suppresses absorption of components containing the at least one element on the etch front.

16. The method of claim 1, wherein the aperture is an aperture selected from the group consisting of a hole and a trench.

17. A method of forming an aperture in a silicon oxide layer, the method comprising:
generating a plasma containing fluorine and bromine;
accelerating ions from the plasma toward a surface of the silicon oxide layer;
etching an exposed portion of the silicon oxide layer, thereby exposing sidewalls of the silicon oxide layer;
absorbing components containing bromine on the sidewalls of the silicon oxide layer; and
continuing to etch the exposed portion of the silicon oxide layer and to absorb components containing bromine on the sidewalls of the silicon oxide layer until an aperture having a desired aspect ratio is attained;

wherein a content of the bromine in the plasma is sufficient to produce a taper angle of the sidewalls of greater than about 87°.

18. The method of claim 17, wherein accelerating ions from the plasma toward a surface of the silicon oxide layer suppresses absorption of components containing bromine on the exposed portion of the silicon oxide layer.

19. A method of forming an aperture in a silicon oxide layer, the method comprising:
generating a plasma containing fluorine and iodine;
accelerating ions from the plasma toward a surface of the silicon oxide layer;
etching an exposed portion of the silicon oxide layer, thereby exposing sidewalls of the silicon oxide layer;
absorbing components containing iodine on the sidewalls of the silicon oxide layer; and
continuing to etch the exposed portion of the silicon oxide layer and to absorb components containing iodine on the sidewalls of the silicon oxide layer until an aperture having a desired aspect ratio is attained;
wherein a content of the iodine in the plasma is sufficient to produce a taper angle of the sidewalls of greater than about 87°.

20. A method of forming an aperture in a silicon oxide layer, the method comprising:
generating a plasma comprising at least one first source gas and at least one second source gas, wherein each at least one first source gas is a fluorocarbon gas and each at least one second source gas is selected from the group consisting of a bromine-containing gas and an iodine-containing gas;
accelerating ions from the plasma perpendicularly toward a surface of the silicon oxide layer;
advancing an etch front in the silicon oxide layer, thereby exposing sidewalls of the silicon oxide layer;

absorbing components from the plasma on the sidewalls of the silicon oxide layer, wherein the absorbed components are selected from the group consisting of bromine-containing components and iodine-containing components and wherein the absorbed components are sufficient to passivate the sidewalls of the silicon oxide layer from attack by fluorine-containing components of the plasma; and

continuing to advance the etch front until a desired aspect ratio is attained, wherein the desired aspect ratio is greater than about 8:1.

21. The method of claim 20, wherein accelerating ions from the plasma perpendicularly toward the surface of the silicon oxide layer suppresses absorption of components from the plasma on the etch front.

22. The method of claim 20, wherein the desired aspect ratio is greater than about 10:1.

23. The method of claim 20, wherein a content of the at least one second source gas is modified relative to the at least one first source gas while advancing the etch front.

24. The method of claim 23, wherein a content of the at least one second source gas is reduced relative to the at least one first source gas while advancing the etch front.

25. A method of forming an aperture in a silicon oxide layer, the method comprising:

generating a plasma comprising at least one fluorocarbon gas and at least one bromine-containing gas;

accelerating ions from the plasma perpendicularly toward a surface of the silicon oxide layer;

advancing an etch front in the silicon oxide layer, thereby exposing sidewalls of the silicon oxide layer;

absorbing bromine-containing components from the plasma on the sidewalls of the silicon oxide layer, wherein the absorbed bromine-containing components

are sufficient to passivate the sidewalls of the silicon oxide layer from attack by fluorine-containing components of the plasma; and

continuing to advance the etch front until a desired aspect ratio is attained, wherein the desired aspect ratio is greater than about 8:1.

26. The method of claim 25, wherein accelerating ions from the plasma perpendicularly toward the surface of the silicon oxide layer suppresses absorption of bromine-containing components on the etch front.

27. The method of claim 25, wherein generating a plasma comprising at least one fluorocarbon gas and at least one bromine-containing gas further comprises generating a plasma comprising difluoromethane and hydrogen bromide.

28. A method of forming an aperture in a silicon oxide layer, the method comprising:

generating a plasma comprising at least one fluorocarbon gas and at least one iodine-containing gas;

accelerating ions from the plasma perpendicularly toward a surface of the silicon oxide layer;

advancing an etch front in the silicon oxide layer, thereby exposing sidewalls of the silicon oxide layer;

absorbing iodine-containing components from the plasma on the sidewalls of the silicon oxide layer, wherein the absorbed iodine-containing components are sufficient to passivate the sidewalls of the silicon oxide layer from attack by fluorine-containing components of the plasma; and

continuing to advance the etch front until a desired aspect ratio is attained, wherein the desired aspect ratio is greater than about 8:1.

29. A method of forming an aperture in a silicon oxide layer, the method comprising:

generating a plasma comprising at least one first source gas and at least one second source gas, wherein each at least one first source gas is a fluorocarbon gas

and each at least one second source gas contains an element selected from the group consisting of bromine and iodine;

accelerating ions from the plasma perpendicularly toward a surface of the silicon oxide layer;

advancing an etch front in the silicon oxide layer, thereby exposing sidewalls of the silicon oxide layer;

forming a polymer residue on the sidewalls of the silicon oxide layer;

passivating the polymer residue on the sidewalls of the silicon oxide layer through reaction with components of the at least one second source gas; and

continuing to advance the etch front until a desired aspect ratio is attained, wherein the desired aspect ratio is greater than about 5:1.

30. The method of claim 29, wherein a bottom width of the aperture is greater than approximately 60% of a top width of the aperture when the desired aspect ratio is attained.

31. The method of claim 29, wherein each first source gas is selected from the group consisting of perfluorocarbons and hydrofluorocarbons.

32. The method of claim 31, wherein each first source gas is selected from the group consisting of trifluoromethane, difluoromethane, pentafluoroethane, perfluoropropene, perfluoropropane and perfluorobutene.

33. The method of claim 29, wherein each second source gas is selected from the group consisting of hydrogen bromide, bromotrifluoromethane, a bromine-substituted fluorocarbon, a bromine-substituted hydrofluorocarbon, hydrogen iodide, iodotrifluoromethane, an iodine-substituted fluorocarbon and an iodine-substituted hydrofluorocarbon.

34. The method of claim 29, wherein the silicon oxide layer contains a silicon oxide material selected from the group consisting of doped and undoped silicon oxide materials.

35. The method of claim 34, wherein the silicon oxide layer contains a silicon oxide material selected from the group consisting of silicon dioxide, tetraethylorthosilicate, a silicon oxynitride, borosilicate glass, phosphosilicate glass and borophosphosilicate glass.

36. The method of claim 29, wherein accelerating ions from the plasma perpendicularly toward a surface of the silicon oxide layer suppresses absorption of components from the second source gases on the etch front.

37. A method of forming an aperture in a silicon oxide layer, the method comprising:

generating a plasma comprising at least one first source gas and at least one second source gas, wherein each at least one first source gas is a fluorocarbon gas and each at least one second source gas is a bromine-containing gas;

accelerating ions from the plasma perpendicularly toward a surface of the silicon oxide layer;

advancing an etch front in the silicon oxide layer, thereby exposing sidewalls of the silicon oxide layer;

forming a polymer residue on the sidewalls of the silicon oxide layer;

brominating the polymer residue on the sidewalls of the silicon oxide layer, thereby passivating the polymer residue from attack by fluorine-containing components of the plasma; and

continuing to advance the etch front until a desired aspect ratio is attained, wherein the desired aspect ratio is greater than about 5:1.

38. The method of claim 37, wherein a bottom width of the aperture is greater than approximately 60% of a top width of the aperture when the desired aspect ratio is attained.

39. A method of forming an aperture in a silicon oxide layer, the method comprising:
generating a plasma comprising at least one first source gas and at least one second source gas, wherein each at least one first source gas is a fluorocarbon gas and each at least one second source gas is an iodine-containing gas;
accelerating ions from the plasma perpendicularly toward a surface of the silicon oxide layer;
advancing an etch front in the silicon oxide layer, thereby exposing sidewalls of the silicon oxide layer;
forming a polymer residue on the sidewalls of the silicon oxide layer;
iodizing the polymer residue on the sidewalls of the silicon oxide layer, thereby passivating the polymer residue from attack by fluorine-containing components of the plasma; and
continuing to advance the etch front until a desired aspect ratio is attained, wherein the desired aspect ratio is greater than about 5:1.

40. The method of claim 39, wherein a bottom width of the aperture is greater than approximately 60% of a top width of the aperture when the desired aspect ratio is attained.

41. A method of forming an aperture in a silicon oxide layer, the method comprising:
generating a plasma comprising at least one first source gas, wherein each at least one first source gas is a fluorocarbon gas;
accelerating ions from the plasma perpendicularly toward a surface of the silicon oxide layer;
advancing an etch front in the silicon oxide layer, thereby exposing sidewalls of the silicon oxide layer;

forming a polymer residue on the sidewalls of the silicon oxide layer;

adding at least one second source gas to the plasma while continuing to advance the etch front, wherein each at least one second source gas contains an element selected from the group consisting of bromine and iodine;

passivating the polymer residue on the sidewalls of the silicon oxide layer through reaction with components of the at least one second source gas; and

continuing to advance the etch front until a desired aspect ratio is attained.

42. The method of claim 41, wherein the desired aspect ratio is greater than about 5:1.

43. The method of claim 41, wherein each first source gas is selected from the group consisting of perfluorocarbons and hydrofluorocarbons.

44. The method of claim 43, wherein each first source gas is selected from the group consisting of trifluoromethane, difluoromethane, pentafluoroethane, perfluoropropene, perfluoropropane and perfluorobutene.

45. The method of claim 41, wherein each second source gas is selected from the group consisting of hydrogen bromide, bromotrifluoromethane, a bromine-substituted fluorocarbon, a bromine-substituted hydrofluorocarbon, hydrogen iodide, iodotrifluoromethane, an iodine-substituted fluorocarbon and an iodine-substituted hydrofluorocarbon.

46. The method of claim 41, wherein the silicon oxide layer contains a silicon oxide material selected from the group consisting of doped and undoped silicon oxide materials.

47. The method of claim 46, wherein the silicon oxide layer contains a silicon oxide material selected from the group consisting of silicon dioxide,

tetraethylorthosilicate, a silicon oxynitride, borosilicate glass, phosphosilicate glass and borophosphosilicate glass.

48. The method of claim 41, wherein accelerating ions from the plasma perpendicularly toward a surface of the silicon oxide layer suppresses absorption of components from the second source gases on the etch front.

49. A method of forming an aperture in a silicon oxide layer, the method comprising:

generating a plasma comprising at least one first source gas, wherein each at least one first source gas is a fluorocarbon gas;

accelerating ions from the plasma perpendicularly toward a surface of the silicon oxide layer;

advancing an etch front in the silicon oxide layer, thereby exposing sidewalls of the silicon oxide layer;

forming a polymer residue on the sidewalls of the silicon oxide layer;

adding at least one second source gas to the plasma while continuing to advance the etch front, wherein each at least one second source gas is a bromine-containing gas;

brominating the polymer residue on the sidewalls of the silicon oxide layer, thereby passivating the polymer residue from attack by fluorine-containing components of the plasma; and

continuing to advance the etch front until a desired aspect ratio is attained.

50. The method of claim 49, wherein a bottom width of the aperture is greater than approximately 60% of a top width of the aperture when the desired aspect ratio is attained.

51. The method of claim 49, wherein adding at least one second source gas to the plasma begins prior to forming a polymer residue on the sidewalls of the silicon oxide layer.

52. The method of claim 49, wherein adding at least one second source gas to the plasma occurs after forming a polymer residue on the sidewalls of the silicon oxide layer.

53. A method of forming an aperture in a silicon oxide layer, the method comprising:
generating a plasma comprising at least one first source gas, wherein each at least one first source gas is a fluorocarbon gas;
accelerating ions from the plasma perpendicularly toward a surface of the silicon oxide layer;
advancing an etch front in the silicon oxide layer, thereby exposing sidewalls of the silicon oxide layer;
forming a polymer residue on the sidewalls of the silicon oxide layer;
adding at least one second source gas to the plasma while continuing to advance the etch front, wherein each at least one second source gas is an iodine-containing gas;
iodizing the polymer residue on the sidewalls of the silicon oxide layer, thereby passivating the polymer residue from attack by fluorine-containing components of the plasma; and
continuing to advance the etch front until a desired aspect ratio is attained.

54. The method of claim 53, wherein a bottom width of the aperture is greater than approximately 60% of a top width of the aperture when the desired aspect ratio is attained.

55. The method of claim 53, wherein adding at least one second source gas to the plasma begins prior to forming a polymer residue on the sidewalls of the silicon oxide layer.

56. The method of claim 53, wherein adding at least one second source gas to the plasma occurs after forming a polymer residue on the sidewalls of the silicon oxide layer.